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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/328,939	06/09/1999	SHUZO FUJIMURA	18867-000410	7514

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EXAMINER	
AHMED, SHAMIM	

ART UNIT	PAPER NUMBER
1765	

DATE MAILED: 09/28/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/328,939	FUJIMURA ET AL.	
	Examiner	Art Unit	
	Shamim Ahmed	1765	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *10 September 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,2,5,9-11,21 and 23-29* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,2,5,9-11,21 and 23-29* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 9/10/04 has been entered.

Response to Arguments

2. Applicant's arguments with respect to claims 1-2,5,9-11,21,23-29 have been considered but are moot in view of the new ground(s) of rejection.

As to the rejection based on the Kikuchi et al (5,007,963), applicants argue that the primary reference Kikuchi et al disclose a plasma comprising water vapor, which is an oxygen bearing species and there is no motivation to combine Lerner patent (5,007,983) to modify the primary reference because Lerner patent teaches the preferability of using oxygen-containing plasma.

In response to applicant's argument, examiner states that a preferable disclosure of a reference (Lerner et al) does not exclude to use the other probability as the Lerner et al teach that halogen gases such as chlorine or fluorine can be substitute by water vapor because both the halogen gas and the water vapor are functionally equivalent (col.4, lines 57-65).

Claim Rejections - 35 USC § 112

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claims 23-29 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

5. Regarding claim 23, lines 5-8, the phrase "wherein the Gas B is selected from at least a chlorine, bromine, iodine or fluorine; wherein Gas C comprises a flow rate defined as a ratio of an amount of hydrogen atom in Gas B to that in Gas A is larger than 1/480" renders the claim indefinite because it is unclear that the Gas B is selected from at least a chlorine, bromine, iodine or fluorine and no hydrogen bearing gas then the question raises that how there will be a flow ratio of hydrogen atom compare to Gas A, which is essentially hydrogen as an element.

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

7. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation

under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

8. Claims 1-2,5,9,11 and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Moslehi (USP 5,089,441) in view of Demmin et al (6,635,185).

Moslehi teaches a dry cleaning process, wherein a gas mixture of hydrogen gas and a halogen containing gas such as HCl or HBr or HF is used to enhance the cleaning process, assuming hydrogen is Gas-A and a Gas-B including a halide (col.7, lines 9-18).

Moslehi teaches that the flow rate of HCl: H_2 is less than about 50 sccm: 12000 sccm (col.5, lines 15-20).

So, Moslehi teaches the limitation of an amount of hydrogen atom in gas-B (HCl) to that in gas-A (H_2) is less than 1/480.

However, Demmin teaches operating conditions of a plasma etching process that can have an effect on the result obtained, wherein the conditions include, for example etching composition flow rate, temperature, etc., (col.7, lines 15-25).

Therefore, it would have been obvious to one with ordinary skill in the art at the time of claimed invention to optimize the flow ratio of Moslehi because Demmin teaches that changing the parameters according to the material being etched appears to reflect a result-effective variable which can be optimized. See MPEP 2144.05 IIB.

As to claim 2, Moslehi teaches that some of the gases can be introduced in the downstream of the plasma as non-plasma state into the process chamber, assuming Gas-D (col.5, lines 10-20).

As to the claims 9 and 11, Moslehi teaches HF and silane are introduced as a process gas (col.7, lines 10-18 and 54-60).

9. Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Moslehi et al (5,089,441) in view of Demmin et al (6,635,185) and further in view of Barth (5,763,326).

Modified Moslehi discussed in the above paragraph No. 8 but fails to teach the introduction of a gas containing carbon as its element in the downstream of the plasma.

However, in a method of plasma etching process for cleaning semiconductor devices, Barth teaches that NF_3 and carbon containing gas such as CF_4 are functionally equivalent for efficient cleaning (col.2, lines 4-6 and col.3, lines 13-16).

Therefore, it would have been obvious to one skilled in the art at the time of claimed invention to combine Barth's teaching of functional equivalency of NH_3 and CF_4 into modified Moslehi's process for efficient cleaning.

10. Claims 23-25 and 28-29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kikuchi (5,620,559) in view of Lerner et al (5,007,983) and further in view of Demmin et al (6,635,185).

Kikuchi discloses a surface treatment process, wherein a gas mixture of hydrogen and water vapor is used to create a plasma, assuming hydrogen is Gas-A and a Gas-B including water vapor (col.3, lines 54-60 and figure 1).

Kikuchi fails to teach that the gas-B comprises a halogen such as chlorine, bromine, iodine or fluorine.

However, in a plasma etching process, Lerner et al teach that halogen gases such as chlorine or fluorine can be substitute by water vapor because both the halogen gas and the water vapor are functionally equivalent (col.4, lines 57-65).

Therefore, it would have been obvious to one skilled in the art at the time of claimed invention to include Lerner et al's teaching into Kikuchi's process for substituting the water vapor with chlorine gas because both the chlorine and water vapor are functionally equivalent in a plasma etching process as taught by Lerner et al.

Kikuchi also discloses that the ratio of the gas flow of the mixed gas is maintained at a desired value (col.3, lines 65-67).

Assuming the Gas-B comprises a hydrogen bearing gas, the Modified Kikuchi fails to teach a flow ratio of hydrogen atom in Gas-B to that in Gas A is larger than 1/480.

However, Demmin teaches operating conditions of a plasma etching process that can have an effect on the result obtained, wherein the conditions include, for example etching composition flow rate, temperature, etc., (col.7, lines 15-25).

Therefore, it would have been obvious to one with ordinary skill in the art at the time of claimed invention to optimize the flow ratio of modified Kikuchi because Demmin

teaches that changing the parameters according to the material being etched appears to reflect a result-effective variable which can be optimized. See MPEP 2144.05 IIB.

11. Claim 26 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kikuchi (5,620,559) in view of Lerner et al (5,007,983) and Demmin et al (6,635,185) as applied to claims 23-25 and 28-29 above, and further in view of Watatani et al (5,620,526).

Modified Kikuchi discussed in the paragraph 10 above, but fails to teach that the gas-D could comprises a gas containing silicon.

However, in a method of cleaning, Watatani et al teach that both the NF_3 and silicon containing gas such as SiH_4 can be used for treatment with enhancing the cleaning capability by removing adhered chemicals onto the substrate (col.3, lines 40-50).

Therefore, it would have been obvious to one skilled in the art at the time of claimed invention to combine Watatani et al's teaching of functional equivalency of NH_3 and SiH_4 into modified Kikuchi's process for enhancing the cleaning capability by removing adhered chemicals onto the substrate as taught by Watatani et al.

12. Claim 27 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kikuchi (5,620,559) in view of Lerner et al (5,007,983) and Demmin et al (6,635,185) as applied to claims 23-25 and 28-29 above, and further in view of Barth (5,763,326).

Modified Kikuchi discussed in the paragraph 10 above, but fails to teach that the gas-D could comprises a gas containing carbon as an element.

However, in a method of plasma etching process for cleaning semiconductor devices, Barth teaches that NF_3 and carbon containing gas such as CF_4 are functionally equivalent for efficient cleaning (col.2, lines 4-6 and col.3, lines 13-16).

Therefore, it would have been obvious to one skilled in the art at the time of claimed invention to combine Barth's teaching of functional equivalency of NH_3 and CF_4 into modified Kikuchi's process for efficient cleaning.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Shamim Ahmed whose telephone number is (571) 272-1457. The examiner can normally be reached on M-Thu (7:00-5:30) Every Friday Off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nadine G Norton can be reached on (571) 272-1465. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Shamim Ahmed
Examiner
Art Unit 1765

SA
September 26, 2004